

### REMARKS

The Office Action of March 20, 2006, has been received and reviewed.

Claims 1-36 were previously pending and under consideration in the above-referenced application. Of these, claims 1-19 and 23-36 stand rejected, while claims 20-22 recite allowable subject matter.

Independent claims 1 and 31 have been amended without prejudice or disclaimer to the subject matter previously recited therein. Claims 2 and 28 have been canceled without prejudice or disclaimer. New claim 37 has been added.

Reconsideration of the above-referenced application is respectfully requested.

### Rejections under 35 U.S.C. § 102

Claims 1, 3-8, 23-27, and 29-36 stand rejected under 35 U.S.C. § 102.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Specifically, claims 1, 3-8, 23-27, and 29-36 have been rejected under 35 U.S.C. § 102(b) for reciting subject matter that is allegedly anticipated by the subject matter described in U.S. Patent 5,123,734 of Spence et al. (hereinafter "Spence").

Spence describes a calibration element that includes an array of pin holes located over an array of photodiodes. The calibration element of Spence is positionable within a chamber of a conventional stereolithography apparatus, with an upper surface of the array of pin holes located at a consolidation elevation of the stereolithography apparatus or a plane that intersects the focal points of a consolidating laser beam.

In use, a consolidating laser beam is generated and moved to a variety of locations relative to the array of pin holes. The distances between adjacent pin holes are known, as are the dimensions (*e.g.*, diameter) of each pin hole. Thus, anticipated movement of mirrors that control the location and, thus, movement of the laser beam may be compared with monitored data, which

is obtained as laser light shines through the pin holes to the photodiode array. Such a comparison may be used to calibrate movement of the mirrors and, thus, of the laser beam relative to the consolidation elevation of the chamber of the stereolithography apparatus.

Independent claim 1 recites a method for calibrating a programmable material consolidation apparatus. The method of independent claim 1, as amended and presented herein, includes viewing, from a location above a consolidation elevation, at least one location substantially at the consolidation elevation.

The description of Spence is limited to use of a photodiode that is positioned beneath the consolidation elevation to monitor the location and/or movement of the laser beam. Thus, Spence does not expressly or inherently describe a method in which at least one location of a consolidation elevation is viewed from a location above the consolidation elevation, as would be required to anticipate each and every element of amended independent claim 1. Therefore, under 35 U.S.C. § 102(b), the subject matter to which amended independent claim 1 is directed is allowable over the subject matter described in Spence.

Claims 3-8, 23-27, 29, and 30 are each allowable, among other reasons, for depending directly or indirectly from claim 1, which is allowable.

Independent claim 31 is directed to a calibration system for use with a programmable material consolidation apparatus. The calibration system of independent claim 31 includes at least one imaging element and a controller in communication with the at least one imaging element. As amended and presented herein, the at least one imaging element of independent claim 31 is configured to be positioned above a consolidation elevation of the programmable material consolidation apparatus.

Again, the disclosure of Spence is limited to a calibration element that includes a photodiode array that is configured for positioning beneath a consolidation elevation of a stereolithography apparatus. As such, Spence lacks any express or inherent description of a calibration system with at least one imaging element that is configured to be positioned above the consolidation elevation. Therefore, the subject matter to which amended independent claim 31 is directed is not anticipated under 35 U.S.C. § 102(b) by the subject matter described in Spence.

Each of claims 32-36 is allowable, among other reasons, for depending directly or indirectly from claim 31, which is allowable.

Claim 32 is additionally allowable since Spence neither expressly nor inherently describes a calibration system with at least one imaging element that comprises a machine vision system. Instead of a machine vision system, the description of Spence is limited to a relatively simple photodiode array.

Withdrawal of the 35 U.S.C. § 102(b) rejections of claims 1, 3-8, 23-27, and 29-36 is respectfully solicited, as is the allowance of each of these claims.

#### **Rejections under 35 U.S.C. § 103(a)**

Claims 2, 9-19, and 28 have been rejected under 35 U.S.C. § 103(a).

The standard for establishing and maintaining a rejection under 35 U.S.C. § 103(a) is set forth in M.P.E.P. § 706.02(j), which provides:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

#### **Spence in View of Suh**

Claims 2, 9, and 28 are rejected under 35 U.S.C. § 103(a) for being drawn to subject matter that is purportedly obvious in view of the subject matter taught in Spence, in view of teachings from U.S. Patent Application Publication 2004/0251242 of Suh (hereinafter "Suh").

Claims 2 and 28 have been canceled without prejudice or disclaimer, rendering the rejections thereof moot.

Claim 9 is allowable, among other reasons, for depending indirectly from claim 1, which is allowable.

In addition, it is respectfully submitted that there are at least two reasons that the teachings of Spence and Suh do not support a *prima facie* case of obviousness against claim 9.

First, it is respectfully submitted that, without the benefit of hindsight that has been provided to the Office by the claims of the above-referenced application, one of ordinary skill in the art wouldn't have been motivated to combine teachings from Spence and Suh in the asserted manner. In particular, it is submitted that neither Spence nor Suh teaches or suggests a process in which calibration of a programmable material consolidation apparatus may be effected by viewing a consolidation elevation of the programmable material consolidation apparatus from above, or that data obtained by viewing from such a location may be evaluated and used in such a way as to determine an amount of adjustment to be made to at least one component of the programmable material consolidation apparatus. Rather, the teachings of Spence are limited to "viewing" a laser beam by detecting the incident locations of the laser beam on the surface of a photodiode array, while Suh provides no teaching or suggestion that relates to calibration; instead, the teachings of Suh are limited to viewing fabrication from an angle so that the height of a fabricated object may be monitored in real time.

Second, it is respectfully submitted that neither Spence nor Suh teaches or suggests each and every element of claim 9. Specifically, neither Spence nor Suh provides any teaching or suggestion that viewing at least one fabricated feature may provide data that may be evaluated and used to determine an amount of adjustment to be made to at least one component of a programmable material consolidation apparatus.

Therefore, a *prima facie* case of obviousness has not been established against claim 9.

#### Spence, Suh, and Philippi

Claims 10-14 are rejected under 35 U.S.C. § 103(a) for reciting subject matter which is assertedly obvious in view of the subject matter taught in Spence, in view of teachings from Suh and, further, in view of the teachings of U.S. Patent 6,483,596 of Philippi et al. (hereinafter "Philippi").

Each of claims 10-14 is allowable, among other reasons, for depending indirectly from claim 1, which is allowable.

Furthermore, it is respectfully submitted that a *prima facie* case of obviousness has not been set forth against the subject matter recited in any of claims 10-14.

In particular, it is respectfully submitted that Philippi does not provide any teaching or suggestion that would remedy the aforementioned deficiencies in the asserted combination of teachings from Spence and Such.

It is also respectfully submitted that Spence, Suh, and Philippi do not, taken either individually or in combination, teach or suggest each and every element of any of claims 10-14.

Claim 10 is allowable because none of Spence, Suh, or Philippi teaches or suggests a calibration method in which a *plurality of reference pixels* are fabricated and viewed. While Philippi teaches a calibration method that includes fabrication of an object, the teachings of Philippi are limited to alignment of a computer-generated object coordinate system with a coordinate system of a stereolithography machine prior to fabrication of the object. Col. 5, lines 48-54. There is no teaching or suggestion in Philippi, or in Spence or Suh, of which Applicants are aware that a fabricated object may be viewed to obtain data for evaluation and use in determining an amount of adjustment to be made to at least one component of a stereolithography system.

Claim 11 is allowable since each of Spence, Such, and Philippi lacks any teaching or suggestion of a method in which actual locations of a plurality of *fabricated* reference pixels are compared with anticipated locations for the plurality of reference pixels.

Claims 12-14 depend from claim 11.

It is, therefore, respectfully submitted that the teachings of Spence, Suh, and Philippi do not support a *prima facie* case of obviousness against any of claims 10-14, as would be required to maintain the 35 U.S.C. § 103(a) rejections of these claims.

Spence in View of Philippi

Claims 15-17 and 19 have been rejected under 35 U.S.C. § 103(a) for being directed to subject matter that is allegedly unpatentable over the teachings of Spence, in view of teachings from Philippi.

Claims 15-17 and 19 are each allowable, among other reasons, for depending directly or indirectly from claim 1, which is allowable.

Additionally, it is respectfully submitted that no combination of teachings from Spence and Philippi supports a *prima facie* case of obviousness against any of claims 15-17 or 19.

First, it is respectfully submitted that, without the hindsight that the claims have afforded the Office, one of ordinary skill in the art wouldn't have been motivated to combine teachings from Spence and Philippi in such a way as to render obvious the subject matter recited in any of claims 15-17 or 19. This is because neither Spence nor Philippi teaches or suggests a calibration method in which a viewpoint is moved. Rather, in Spence the viewpoint comprises the plane within which the surface of a stationary photodiode array resides, while the viewpoint of the process disclosed in Philippi appears to be a stationary camera.

Second, and even more fundamentally, it is respectfully submitted that neither Spence nor Philippi teaches or suggests a method that includes moving a viewpoint, as recited in claim 15, from which claims 16, 17, and 19 depend.

Further, with respect to claim 17, Spence and Philippi both lack any teaching or suggestion of moving a viewpoint substantially linearly.

As for the subject matter recited in claim 19, neither Spence nor Philippi includes any teaching or suggestion of determining a number of reference pixels as a viewpoint is moved a particular distance.

Therefore, it is respectfully submitted that a *prima facie* case of obviousness has not been established against any of claims 15-17 or 19.

Spence, Philippi, and Cohen

Claim 18 is rejected under 35 U.S.C. § 103(a) for reciting subject matter which is assertedly unpatentable over teachings from Spence, in view of the teachings of Philippi and,

further, in view of the subject matter taught in U.S. Patent 5,287,435 to Cohen et al. (hereinafter "Cohen").

Claim 18 is allowable, among other reasons, for depending from claims 1 and 15, which are allowable. Claim 18 is further allowable since Cohen, which lacks any teaching or suggestion with respect to a calibration method, let alone a calibration method that includes viewing a calibration elevation of a programmable material consolidation apparatus or moving a location, or viewpoint, from which such viewing is effected, does not remedy the aforementioned deficiencies in the proposed combination of teachings from Spence and Philippi.

Furthermore, while Cohen notes that transitions in contrast may be detected, none of Cohen, Spence, or Philippi would have provide one of ordinary skill in the art with any reason to expect that detection of transitions could be used in a method for calibrating a programmable material consolidation apparatus.

As such, it is respectfully submitted that a *prima facie* case of obviousness has not been established against claim 18.

It is respectfully requested that the 35 U.S.C. § 103(a) rejections of claims 2, 9-19, and 28 be withdrawn and that claims 9-19 be allowed.

#### **Allowable Subject Matter**

The indication that claims 20-22 recite allowable subject matter is noted with appreciation. None of these claims has been amended to independent form, however, as the claims from which they depend are also believed to be allowable.

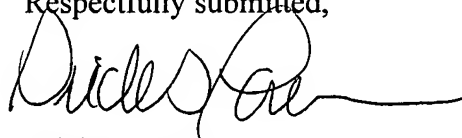
#### **New Claim**

New claim 37, which depends from claim 31, has been added. It is respectfully submitted that new claim 37 does not introduce new matter into the above-referenced application.

**CONCLUSION**

It is respectfully submitted that each of claims 1, 3-27, and 29-37 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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